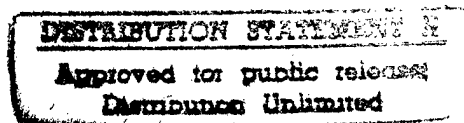# *FINAL REPORT OF THE ECSU HOME-INSTITUTIONAL SUPPORT PROGRAM*

SUBMITTED TO

THE OFFICE OF NAVAL RESEARCH

BY

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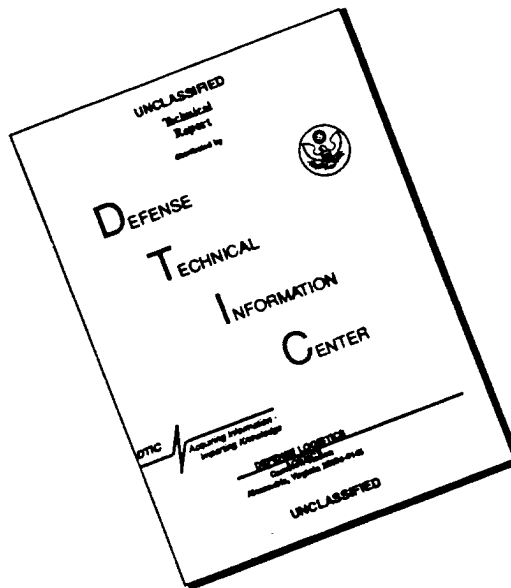Email: lhayden@ga.unc.edu

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13. ABSTRACT (Maximum 200 words)

   Included in this report is information on program activities for the Home Institution Support Program. Details of the Visiting Lecture Program, the student/sponsor travel program, and the Macintosh computer network are included. Statistics on enrollment, GRE, and GPA are also provided.

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PART I: A succinct narrative which should summarize last year's objectives and accomplishments.

    A. Specific program objectives for the past year (please restate the overall goals and specific objectives of your program. Be as quantitative as possible.)

The ECSU-ISSP Home Institution Support Program provided a strong home institution support environment, for Elizabeth City State University students who participated in the HU-ONR Intensive Summer Studies Program (ISSP). This basis of support nurtured the research interest of our ECSU-ISSP students and better equiped our students to gain as much as possible from the HU-ISSP experience. This program had three components :

1) A macintosh computer network.

2) A visiting lecturer program

3) A student/sponsor travel program

THE FOLLOWING PAGES DESCRIBE EACH OF THE COMPONENTS LISTED ABOVE.

Office of Naval Research Student Research Lab

Location:

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Networking:

- Currently all workstations are networked using TCP/IP (NIS and NSF servers) allowing complete access to the internet.

- Upgrading to ATM Technology Summer '95

HARDWARE

3	Silicone Graphics Workstations (INDY2 and Iris)
10	Additional INDY2 workstations to be added summer'95
12	Sun Sparc Workstations running Sun O/S
10	486 PC converted to LINUX
2	Power Macintosh 8100
1	Power Macintosh 7100
12	Macintosh Computers (IIci, classic II, LC)

Peripherals and Printers

- Variety of Laser and Color Printers
- Color and Greyscale Scanners
- VCR/TV
- Color Cameras
- INDYCAM
- Projection Panels

Tutorial Assistance is available daily to student researchers.

VISITING LECTURE PROGRAM

The Visiting Lecturer Program provided funds to bring speakers to our campus each semester. These outside speakers were chosen to stimulate faculty research and give additional insight to students. Students gained exposure to role models other than those within their departments.

The following individuals participated in the Visiting Lecturer Program.

Dr. K. C. Wong Professor of Compuer Science, Fayetteville State University (July, 1994) spoke on The Client Server Model

Melvin Blackwell Owner of SoSoft Software Consultant Company (Jan. 20, 1994) spoke on The Client Server Model

Mr. Robert Norris spoke (Oct. 26, 1993) Virtural Reality

Mr. Eric Harris (Nov. 11, 1993) spoke on Software Testing and Internships

Dr. William Hawkins (Feb. 17, 1994), Director of SUMMA for the Mathematical Association of America spoke on Contributions made by Black Mathematicians and Computer Scientists

Dirlene Cannon (Mar. 25, 1994), System Analyst with Comtek Federal Systems spoke on X-Window Environment

Dr. Scott Owen (Mar. 30, 1994), Education Chairman for ACM/SIGGRAPH spoke on Computer Graphics and Visualization.

Dr. Beauregard Stubblefield (Feb. 17, 1994) spoke on Mathematics and Medicine

Sharon L. Ramsey, Staff Computer Scientist, Process Control & Computer Technology Division of Alcoa Laboratories (Oct. 1992) spoke on Computer Visualization and the Motif GUI.

Tom Zipoll, Engineer with Sun Microsystems (Feb. 1993) conducted the Sunsparc New Users Seminar.

Darnley Archer, Programmer Analyst for St. Mary's College of Maryland (March 1993) conducted an Introduction to Windows.

Dr. Guy Hogan from Norfolk State University (Feb. 1993) was the guest speaker during our Sixth Annual Colloqium on Black Mathematicians and Computer Scientists.

Mark Gilicinski from the National Security Agency (July 1992), spoke on Large Software Development Projects during .

Student/Sponsor Travel Program

The travel funds available through this grant were used to support student travel to undergraduate research conferences where these students presented there research findings. In technical fields, the information available at conferences and meetings, reflect the current state-of-the-art. This critical information is often not available, in a timely fashion, through print media. In addition, the association and contacts with other researchers, scientist, and vendors, at these meetings, often prove invaluable.

The following is a list of the conferences and meetings which students and their sponsors attended:

• Second Annual HBCU/Private Sector Energy Researchand Development
• Technology Transfer Symposium National Conference on Undergraduate Research
• Georgia Tecg FOCUS/King Week Celebration
• NAFEO High Tech Expo
• National Undergraduate Research Conference
• Black Issues in Higher Education Graduate School and Job Fair
• SOAR Conference (Seizing Opportunities for Advancing Research)
• NAAAS (National Association of Africian American Studies)

B. Mentoring activities: how were mentors selected and trained? What were the major mentoring activities? How frequently did mentors meet with students?

In the past we have held rather informal sessions with our department student researchers on the second Wednesday night of each month from 5:30 PM until. Since many student researchers have a key to the laboratory, they often remain well into the night to assist one another with their classwork and research projects. We have used these opportunities to discuss topics of interest to the whole group (i.e. upcoming travel opportunities, preparation of abstracts in specific formats required for submission, photo opportunities, progress checks, dissemination of graduate school information and internship opportunity information, preparation of overhead transparences and posters for student use during their travel. We usually chip in and order pizza for the group. This has proven to be a successful technique for mentoring, and the tradition has been made part of the new NERT in PPCV program funded by ONR.

It was a policy to have the ISSP students serve as tutors for other students. The tutoring assignments allowed the ISSP students to keep current on material learned in previous classes. Research shows that students who serve as tutors gain a deeper insight into the material.

Many of the ISSP students were assigned to work in the Macintosh laboratory giving technical assistance to their classmates. This policy gave the ISSP students access to and time to review the individual training modules available in the laboratory. Further, Sharon Saunders and Cory Cooper worked under the supervision of Dr. Hayden to design and carry out a Macintosh

network training program from which all ISSP students could benefit.

To compliment the efforts made with in the CCMP departments, or ISSP students were strongly advised to take full advantage of the ECSU campus services. ECSU has already in place a host of student services including individual and group counseling and developmental group activities. Also contributing to the nurturing atmosphere at ECSU is the fact that we have only a 5% rate of adjunct faculty. Further, the university regularly holds family meetings both campus wide and within the individual department. Social activities are scheduled each semester to allow faculty and students to relate outside of the classroom. This includes both a Christmas dinner in the fall and a cookout in the spring. Faculty and students work together to make these events a success.

We at ECSU have a long and proud history of mentoring minority students. Many of whom are first generation college students. Recognizing that, we maintain contact with the homes and families of our students and invite their families to contact us.

C. Curriculum changes/enhancements supported by this ONR grant.

No curriculum changes/enhancements were supported under this grant.

*Faculty self-improvement activities: where were these performed and what were the activities?

No faculty self-improvement activities were funded through this ONR program

*Visiting faculty: provide names, departmental affiliations, and major activities.

No visiting faculty were acquired through this program.

*Other faculty activities under this grant which you wish to report.

There were no other faculty activities under this grant.

D. Programs for students supported by this ONR grant (In this section please discuss recruiting activities, summer educational/enrichment programs, research opportunities, internships, mentoring programs, problems associated with mentoring programs)

For the summer of 1994, Hampton University(HU) program officials requested ECSU to select 9 students to participate in the HU-ISSP program. The Hampton University ISSP program offer students the opportunity to take major courses which are not offered at ECSU. During the ISSP program, students have the opportunity to perform research (at the appropriate level) within their discipline.

Mr. Willis, Director of the Hampton SEMS program has informed us that this will be the last summer that students from other universities will be invited to participate in their ISSP. The restriction of ISSP to include only HU students was necessitated by current funding of that program. We have however initiated a summer research program in parallel processing and computer visualization in which many of these students will be included.

The following is a complete listing of all the 1994 summer ISSP program participants from ECSU. (Classifications are as of Summer '94. The Mean GPA of all 1994 participants is 2.961)

1994 ISSP Students

name	major	class
Clutilda Monk	math ed	sophomore
Richard Flood	physics	sophomore
Robert Holley	chemistry	sophomore
Guana Dixon	chemistry	junior
Christopher Roberts	physics	sophomore
Matresha Walker	cs	sophomore
Reginal Turner	cs	junior
Tonya Best	cs	junior
Dovella Moore	cs	sophomore

E. Facilities and equipment supported by this grant (purchases, impact on program)

The following is a list of hardware purchases which have enhanced the Macintosh network of computers. We have also added ethernet cards to the LC computers and the IIci computer.

Hitachi VHS CAMCORDER
6 Mac classic II bundle w/ personal laser printer
cdrom drive
HP ScanJet II scanner
Fotoman Digital Camera
tvt projection panel
Battery Recharger
4MB SIMMS
POWERBOOK 165
APPLE NEWTON
LASERWRITER PRO 630 printer
BJC600 bubble jet printer + supplies

The following is a list of software and reference material purchased to support the student researchers and the Macintosh network.

Renderman
Minix
MACDRAW PRO
IMAGES WITH IMPACT-PEOPLE 1
ALDUS 4.0 ADV. VIDEO
ALDUS 4.0 INTRO VIDEO
M.SOFT WORKS 2.0 ADV VIDEO
STUDYWARE GRE
STUDYWARE SAT
DRAWART CLIPART BUS & ED
DRAWART ACCENTS & BORDERS
101 SCRIPTS & BUTTONS H.CARD
HYPERTOOL 2.1
MACPRINT 1.2
SWIVELART 3D CLIPART
hypercard 2.0 creating cards & stacks
system 7 using the Mac interface video
adv. system 7 features
Ind. training for pagemaker 4.0
microsoft works adv. database
    + database & form letters
microsoft works spreadsheet
macintosh survival course
Mac repair & Upgrade secrets
folder bolts
Macintosh programming fundamentals

mega rom 2.1 cdrom
100ns 2mb simms
clickart cdrom
bannermania cdrom
computer cleaning kit
clickart vol 5 b orders
cd software encycl., atlas, sci
development software & tutorials
microsoft works 3.0
POSTERWORKS
effects specialist
multiclip
programmer cd reference
magnet
BBS in a box vol VII
disk express II 2.10
the system 7 book
using the Mac with system 7
The Mac classic book
Using MacDraw Pro
typestyler
norton utilities
power users toolkit
randonhouse encyclopedia
wordperfect office
cd7 super library
gigabyte 2.0 cdrom

F. Specific program objectives for next year (please be as quantitative as possible).

ONR has funded a program entitled "Nurturing ECSU Research Talent" at ECSU. This program will include all students currently involved in the Home Institution Support Program. This is the final report of the Home Institution Support Program since the program has terminated.

1994-95 ENROLLMENT AND GPA REPORT

<u>Data on student enrollment and performance is requested for the overall science and engineering student body, and for students supported under the ONR grant in order to have an internal comparison at your school.</u>

Please see the following table for data. Our Institution does not offer a degree in engineering. No biology majors are involved in this program. **ONR students made up 17.4% of the graduating class and 66.7% of those who went on to graduate school.**

Major Discipline	Number of students enrolled at school (by year)				Number of students enrolled in ONR Program (by year)				Number of students graduated		Number Graduate Professional School	
	FR	SO	JR	SR	FR	SO	JR	SR	total	ONR	total	ONR
ENGINEERING	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BIOLOGY	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHEMISTRY	4	3	9	6	0	0	0	0	3	0	2	0
COMPUTER SCIENCE	42	28	21	31	5	1	6	5	22	7	0	4
MATHEMATICS	11	16	25	12	4	0	0	0	8	0	0	0
PHYSICS	0	0	7	0	0	0	2	0	0	0	0	0
TOTALS	57	47	62	49	9	1	8	5	33	7	2	4

Class Year	Mean GPA for all students	Mean GPA for ONR students
Freshman	2.331	3.498
Sophomore	2.502	3.740
Junior	2.709	3.050
Senior	2.956	3.023

1994-95 GRE DATA

	total
ONR	1150.71
ALL	1109.22

Computer Graphics/Visualization Project Description
3-D Modeling and Viewing

The computer visualization project, which students funded under AASERT will investigate, shall consist of three stages. In the first stage, the student researchers will be given lectures concerning solid modeling and visualization. For the solid modeling, they will learn how to represent a solid object using a edge-based boundary model. They will also be taught how to obtain a new object from an existing one or from scratch using Euler operators. As to visualization, they will be given the concepts of 3D viewing, shading and texturing.

In the second stage, the students will define data structures for a solid object using the edge-based boundary model and define a subroutine for each Euler operator. Then we will use the Euler operators to build a set of primitives such as cube, sphere, cylinder, cone and torus. We will also use the Euler operators to build high level operators like sweeping (including both translational sweep and rotational sweep), gluing and assembling. After this stage, students have a simplified solid modeling system based on Euler operators.

In the third stage, students will develop the software for the Gouraud shading and Phong shading as well as for the solid texturing. Finally, they will design objects using the solid modeling system build in the second stage and visualize these objects using the software developed in this stage.

Visualization/Graphics Team

Instructor:	Dr. Jingyuan Zhang
Assistant Instructor:	Stephanie Vaughan
Consultant:	Dr. Scott Owens
ECSU Student 1:	Sharon Saunders
ECSU Student 2:	Kevin Trotman
ECSU Student 3:	Denisa Edwards
High School Student 1:	LaVonna Felton
High School Student 2:	Jackie Hall

Parallel Processing Research Project Description

The sieve of Eratosthenes has long been a standard benchmark program for integer operations on a sequential computer. We will develop a parallel prime number sieve to demonstrate several concepts fundamental to parallel computing. This example also illustrates a process of parallel program development which can be usefully applied to many problems.

After defining the problem and a sequential solution, we will begin the development of a parallel algorithm by analyzing the actions which must be taken and the order constraints on those actions. This makes it possible to define a maximally parallel, although impractical, algorithm. We will then develop a practical algorithm which can be mapped to a network of message passing processors, a pipeline.

The mapping of the algorithm to the array of processors brings up the issue of load balancing. We will develop an algorithm for static load-balancing, allocating the work so that each processor will have about the same amount to do.

We will investigate the performance of the algorithms by measuring the speedup and efficiency. Amdahl's Law gives theoretical limits on the speedup which can be obtained from parallel computers. This will lead to a final refinement of the algorithm based on using an efficient sequential algorithm within processors while maintaining the pipeline between processors.

The final aspect of algorithm development will be an analysis of communication issues: 1) Buffering between the processors reduces processor idle time spent waiting for communication with a neighboring processor; and 2) The effect of packing the integer messages into larger messages between processors so as to increase overlapping of communication with computation.

Parallel Processing Team

Instructor:	Dr. Johnny Houston
Assistant Instructor:	Michelle Brown-Emmanual
Consultant:	Dr. Nan Schuller/Christopher Nevison
ECSU Student 1:	Ervin Howard
High School Student 1:	Connie Sawyer
High School Student 2:	Kuchumbi Hayden
High School Student 3:	Derrek Burrus

A Winning Formula

by C. J. Houtchens

The women in this story are in a minority group so small that in some years when national statistics are gathered, there is no one in the category at all. These women have paid a high price to be counted among their small number and have beaten the long odds placed against them simply because of their gender and race.

Martha Brown '89, Linda Hayden '89, Joan Sterling Langdon '89, and Elaine Smith '88 hold Ph.D.s in mathematics from American University. Their colleague Ann Taylor '88 earned her AU doctorate in education administration with an emphasis on teaching college-level mathematics. Their achievement defies the notion that females should abandon math in junior high school and leave the difficult calculations to men. It rejects the idea that an advanced degree is not an attainable goal for African-Americans, who historically have not funneled into the graduate school system at a rate anywhere near comparable to that of white Americans.

In the seven years 1985 through 1991, according to a National Research Council survey contained in the June 1992 Commission on Professions in Science and Technology report *Professional Women and Minorities*, 1,887 white men, 470 white women, 27 African-American men, and a mere 12 African-American women in the entire United States reported having earned a doctorate in mathematics. It doesn't take more than a knowledge of simple arithmetic to figure out that AU's four female African-American math Ph.D.s represent a full *one-third* of a very elite club. And with four more African-American women currently working on math doctorates at AU, it's clear the success of those seven years wasn't just a fluke.

We must be doing something right.

If you ask Nina Roscher, chair of AU's chemistry department and a faculty member since 1974, what it is that makes the difference, her cheeks pinken and she says quietly, "Dr. [Mary] Gray and I work hard for women." Gray, a former chair of AU's mathematics and statistics department and a professor there since 1968, is the person most often credited with focus-

It doesn't take more than a knowledge of simple arithmetic to figure out that AU's female African-American math Ph.D.s represent a full one-third of a very elite club.
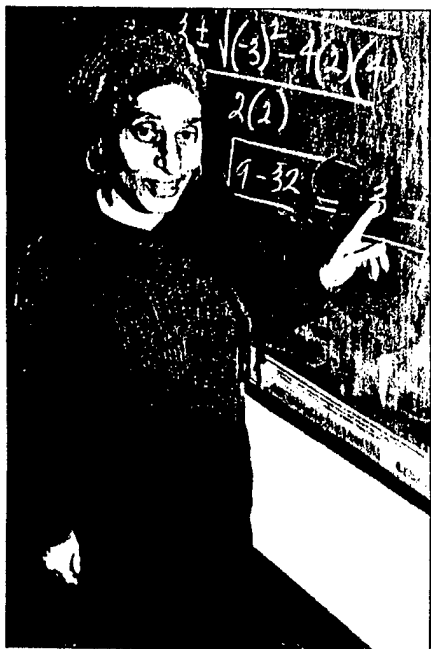
Elaine Smith points the way in a classroom at the District of Columbia's Wilson High School, where she teaches and also directs a new after-school tutoring project, the Math Center. Smith, who taught at the college level for many years, decided that she could steer more kids into math by reaching them in high school, before they begin to opt out of hard courses. "Our kids are slipping through the cracks," she says. "We have to meet [them] where we find them and move them from here."

ing AU's commitment to women and minorities in math. Roscher has had similar success boosting AU's stats for women and minorities with Ph.D.s in her own field.

"I was one of 9 women out of 450 chemistry graduate students" working toward a 1964 Ph.D. at Purdue University, Roscher recalls, with a slight tightening of her lips. "Very unpleasant. . . . It certainly has a lot to do with why I am committed."

Gray claims to have had an easier time in grad school at the University of Kansas. Except, she says, "I had a real

jerk for my first class, who said, 'What are you doing here? Why don't you stay home and take care of kids?' But that just made me work harder." Gray has long been committed to civil, women's, and human rights, and was elected chair of Amnesty International USA last fall (see page 7).

Both Gray and Roscher have been in the trenches, and neither is the type to pull punches. Graduate school in math is an arduous and *at least* three-year-long haul in a woman's prime child-bearing time . . . with no guarantees of good jobs, promotions, or tenure at the other end, says Gray. "[There] is just point-blank prejudice on the part of people in the mathematical community that women can't do math. . . . When I started out thirty years ago they would say it. Now they don't say it, but it still affects their hiring decisions, their promotion and tenure decisions," Gray says. Adds Roscher, "[And] we can't appreciate fully the problems that black women face."

But being realistic about all those problems is the first thing AU does right. For starters, through networking with professional associations, other academic institutions, and alumni of the mathematics Ph.D. program, the university makes a conscious effort to attract women to the program who may have been out of school for a while. Candidates for the mathematics education doctorate must have already earned a master's degree in either math or education. Both Gray and Roscher say that older students tend to be more committed to completing the Ph.D. But they also often have more demands to juggle—like spouses and children—and are likely to be giving up fairly comfortable earnings in order to take on the life of a student again.

Linda Hayden had earned a master's of teaching in mathematics from the

University of Cincinnati in 1972 and was teaching math and computer science at Elizabeth City University, North Carolina, when she decided that she really needed a Ph.D. She tried a computer science program at another university first but encountered "a lot of frustration," she says. "[The program] was brand new. . . . Courses weren't in place, and teachers couldn't give you a curriculum and say, 'Choose from these courses. When you do this amount of work then you will take your comps [comprehensive examinations], and so on. . . . It was all men, and there was just no understanding at all, no role models there. . . . I said, this is just not

Joan Sterling Langdon takes a rare pause at her desk at Bowie State University, Maryland, where she is an associate professor of computer science. For the past four years, Langdon has also served as director of an undergraduate and graduate student training program at NASA's Goddard Space Flight Center, cosponsored by the center and Bowie State. "The 'Dr.' in front of your name really makes a difference to NASA," she says.

do-able at this time at this institution."

Hayden settled for a master's degree in computer science instead, as did her graduate school colleague, Joan Sterling Langdon. But Langdon kept looking. When she heard about the AU program she says, "I called Linda up in the morning, somewhere like 6 o'clock. . . . She listened. She said, 'Okay.' Then she hung up the telephone."

"I rolled over and went back to sleep," laughs Hayden.

"She called me back about an hour later, and she said, 'Joan, I really wish you hadn't called me,'" Langdon jokes. "Then, of course, everything started developing."

"Joan and I were both very motivated . . . and were looking for a place where [earning the Ph.D.] was do-able within a finite amount of time," Hayden explains. "We got the impression that if we were dedicated and worked hard, we would get it. We didn't mind that. . . . Like I tell my students, 'Put your butt in the chair and your head in the book.' . . . But sometimes you can get into situations where there are a lot of politics involved. Also, being black women, in places where there is a lot of racism, there are a lot of other undercurrents that sort of deter you from your goal. We didn't feel that [when we visited AU]."

"You don't want to go to a school where you don't think you are going to get out of there," says Ann Taylor. At Bethune-Cookman College in Daytona Beach, Florida, where she has taught since 1968 and is now vice president of academic affairs and dean of the faculty, Taylor knew two faculty members who had gotten doctorates from AU. "American had a track record, as far as I was concerned, with African-Americans being able to complete their work."

That's the kind of track record that

Martha Brown demonstrates her teacher training workshop leadership style. Brown, supervisor of mathematics for Prince George's County, Maryland, schools, oversees curriculum and staff development for the county's 175 kindergarten through twelfth-grade schools, a job that keeps her on the road in Prince George's and at conferences around the country. Nevertheless, she is working part-time on another degree . . . in divinity, at Wesley Seminary.

PHOTO BY MELISSA LATISCH

historically black schools, colleges, and universities—like Bethune-Cookman— have enjoyed for many years. For one thing, they offer strong role models. For another, says Elaine Smith, they have the reputation of being "far more nurturing and supportive of their students." Both are factors AU College of Arts and Sciences dean Betty Bennett points to in assessing AU's success. "The College of Arts and Sciences has always had a large number of women faculty members," she says. Out of twenty-five women on the math and stat faculty, six, or 24 percent, are women—a high percentage consider-

ing that nationally women constitute only 5 percent of math faculties at Ph.D.-granting institutions. Two of AU's female math faculty are tenured full professors. One of those, Nancy Flournoy, is the current department chair. "These women, who have accomplished so much themselves, have served as role models to the students," Bennett says. "And the commitment of the faculty to increasing the numbers of women and minorities has resulted in attracting those students and seeing them through. I think they realize that they are coming to a supportive environment."

But supportive, as Joan Langdon points out, doesn't necessarily mean coddling. Langdon grew up in South Carolina during the days of segregation and attended an all-black high school. "[The teachers] were not just peachy keen and everything that you did was wonderful. They let you know when you were messing up and they let you know when you were doing the right thing," she says. "That is the way it is with Mary Gray. . . . Primarily, she made sure that we stayed on track and did our work and got out of The American University."

Langdon remembers a time when she was working on her dissertation and was "really busy" but wanted to go home at Christmas to see her dad. "Dr. Gray said to me, 'Go . . . when you finish your degree.'" Langdon says her father laughed and agreed, "Well, you know, you really should work before you play."

"Mary has been a wonderful friend," says Ann Taylor. "I am not going to say that I was happy with Mary all the way through, because sometimes she gave me a fit. But it was all worth it. She was that way because she wanted me to do well and she wanted me to do my best."

Elaine Smith and Gray both acknowl-

edge that they butted heads through most of the ten years that Smith was working on her degree while also teaching as an adjunct faculty member. "There were a lot of things I admire about Mary and still do. . . . [But] we are both very strong women, very strong women. . . . You know she didn't take much. I didn't take much. I have a mouth. She has a mouth. You get the picture," Smith says. For Smith, support also came in the form of classmates—a network Gray explicitly encourages.

"I would never have made it without them," Smith says. "Never. I bugged people to death. Child, there were spouses who stopped talking to me because I was calling up their husbands so much at night" looking for help with complicated concepts. "I didn't even care because I had to get it, and they were willing to help me get it. That is how I survived."

Says Martha Brown, "The big thing for me was, [would] AU permit part-time participation in the program? I had a job. I needed a job. And if I [was going to get a Ph.D.] I had to do it on a part-

Linda Hayden '89 works out at the blackboard at Elizabeth City University, North Carolina, where she is a professor in the department of mathematics and computer science. Hayden recalls graphing functions at home for hours as a high school student "because they were beautiful to me." Today, in addition to regular teaching duties, she pursues grants to provide math conference trips and special project experience for a select group of undergraduate math majors she calls "Hayden's Scholars."

time basis. That was not . . . a problem with AU."

But the other women were taking time out of their already established careers and looked to the university for solid financial help. That's where part-time teaching positions and Nina Roscher came in.

Roscher has spent more than half her career in university administration, particularly in graduate and academic affairs, and since 1986, has also held a part-time position as program director

of science education in the National Science Foundation. She knows the world of grants cold and since 1981 has used that expertise to bring hundreds of thousands of dollars to AU for more than thirty women and minority graduate students in math, chemistry, and law, through the federal government's Patricia Roberts Harris Fellowship Program. Named for the first African-American woman to attain a cabinet position (secretary of housing and urban development and of health education and welfare under Pres. Jimmy Carter) and to head a U.S. law school (at Howard University) the program provides selected graduate schools with stipends for students whose race or gender or both have been, in federal jargon, *underrepresented* in certain fields. For mid-career students like Hayden, whose husband and nine-year-old son packed up and moved to Washington with her, and Langdon, who, when she came to AU was a single mother with six-year-old twin girls and a thirteen-year-old daughter, the stipends made all the difference.

Make no mistake, for every one of these women, getting that Ph.D. was a sacrifice. But they have more than gender and race in common. These women also possess incredible energy—just

But supportive doesn't necessarily mean coddling.

try pinning one of them down on the telephone after six o'clock in the morning or before ten o'clock at night—and another quality, one that perhaps can best be called tenacity.

Says Elaine Smith, "It was a struggle, honey. It was a long and hard struggle from beginning to end. . . . I am fond to this day of telling my students that I got my Ph.D. in Perseverance. At some point I just refused to walk away not having that piece of paper to show for all the time and energy that I knew I had already put into it."

"It was tough for me," says Ann Taylor, who "burned up I-95 and the airlines" between Washington, where she lived while working on her degree, and Daytona Beach, where her husband is on the faculty at Bethune-Cookman. "I shed a lot of tears. I can remember many an evening leaving the campus and crying all the way through Rock Creek Park as I drove home. But I don't know anybody who gets through a doctorate without shedding a tear."

And was it worth it?

"I can honestly say yes. We were up a lot of hours, we were poor, we went through a lot of changes . . . but it was all worth it. It was a good move," Langdon says.

"Yes," says Smith. "To see the looks on my students' faces as I tell them the stories of how I went after that degree and to hear them ask me why is it that they call me 'Doctor,' giving them the opportunity to share some of these things,

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that alone has been worth it."

What with the promotions and the job offers, the conferences and the grants, and the recognition that all of these women have received since earning that degree, it would be easy to say that Smith is just mouthing platitudes. But that's clearly not her style. What she is talking about is indeed the real payoff of AU's success . . . because the women in this story believe that every African-American woman who achieves that Ph.D. is a new role model for an elementary school child, or a high school student, or a college student who could be in graduate school someday and on the way to making sure that this small group gets bigger faster.

Says Linda Hayden, who has returned to teaching at historically black Elizabeth City University, where this past year 60 percent of the seniors from a group she mentored decided to go on to graduate school, "That's what gets me up in the morning."

Ann Taylor, vice president of academic affairs and dean of the faculty of Bethune-Cookman College, *left*, savors a sweet moment with her former Ph.D. advisor and mentor, AU professor of mathematics and statistics Mary Gray, following the April 1992 ceremony in which Taylor received one of the university's first Lodestar awards, recognizing her achievements.